Small Business Innovation Research/Small Business Tech Transfer

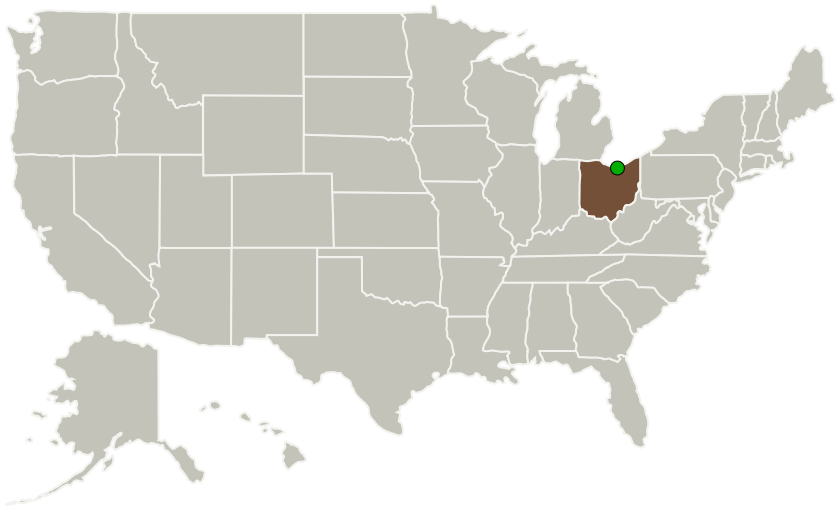
Wide Temperature, High Voltage and Energy Density Capacitors for Aerospace Exploration, Phase II

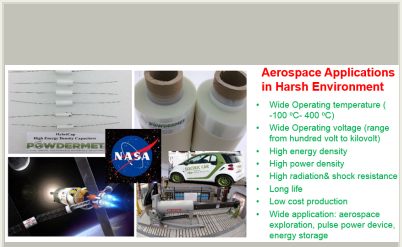
Completed Technology Project (2016 - 2018)

Project Introduction

The technical approach proposed in the Phase II program builds on the encouraging results of the Phase I program, in the excellent energy storage performance over a broad temperature range. In this Phase II program, the proposal nanocomposite films will be feature as high energy density (>12 J/cc), dielectric breakdown strength (>600 MV/m), high wide operating voltage (hundred volt to kilovolt), high power density (>4 MW/cc) as well as high energy storage efficiency (>96%). The capacitor energy storage module fabricated from the developed films will be feature as high energy density (>5 J/cc), high wide operating voltage (hundred volt to kilovolt), high power density (>2 MW/cc), high radiation environment, high shock (up to a 1000Gpeak) and vibration (up to 60 Grms) resistance, safe and long cycle life of 1,000,000 cycles at room temperature and more than 100,000 cycles at 400?C for future NASA scientific mission in harsh environment. The This continued development will further prove feasibility of this technology and move the technology from space TRL level 3/4, demonstrated in the Phase I, to a TRL level 5/6 at the end of the Phase II, with parts that could be tested in NASA ion thruster propulsion discharge power system (4 kW, 200 VDC and 20 amps) by the end of the two-year Phase II if an applicable system is found for testing.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Powdermet, Inc.	Lead Organization	Industry	Euclid, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations
Ohio

Images

Briefing Chart Image
Wide Temperature, High Voltage and Energy Density Capacitors for Aerospace Exploration, Phase II *(https://techport.nasa.gov/image/135819)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Powdermet, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

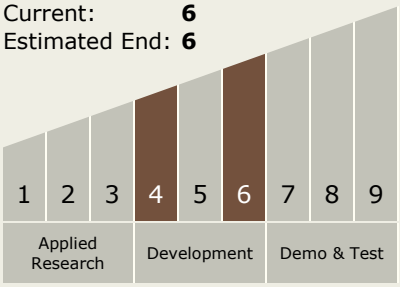
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Haixiong Tang

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.3 Power Management and Distribution
    - TX03.3.2 Distribution and Transmission

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System